REMARKS

Reconsideration is respectfully requested.

By this amendment, headings are provided to the Specification, and Claims 27, 28 and 34-36 have been amended to remove the multiple dependent claims which depend from multiple dependent claims. An Abstract of the Disclosure has been amended and a clean copy is attached.

Most of the objections raised by the Examiner appear to result from a misunderstanding of the invention. The invention is conceptually quite simple. When a reflective surface is substantially flat, incident light will bounce back into the eye of the observer, and the surface will appear to be bright. When the surface is rough and irregular, like a rocky outcrop, light will bounce off in all directions and only a small proportion will bounce back to the eye of the observer. Accordingly, the surface will appear to be dark. Thus a surface which is "rockier" will have greater diffuse scattering characteristics and will appear to be a darker shade of grey, whereas a surface which is flatter and smoother will have lesser diffuse scattering characteristics and will appear to be a lighter shade of grey.

Electron beam lithography may be used to carve microscopic three dimensional patterns on the surface of an object. The present invention makes use of a "palette" of a limited number of different types of surface structure regions, each region being selected either by design or experimentally for having a particular degree of diffuse scattering, or conversely a particular degree of reflectivity. Each microstructure region is preferably too small to be separately discernable by the human eye, so each region therefore contributes simply a grey scale pixel, which can be combined with the pixels generated by the other regions to create a full grey scale image.

Referring specifically to the matters raised in the Official Action, a region with "diffuse scattering characteristics" will inevitably appear to an observer to have "a particular shade of grey when viewed from any direction", because diffuse scattering is by definition non-directional. This contrasts the present invention with the prior art, in which individual regions are diffractive regions, and the diffraction images generated are observable only from limited ranges of viewing angles around the device.

With regard to the phrase "too small to be separately resolvable to the human eye", this measurement is quite well known in the art. The human eye is not capable of resolving objects smaller than about 0.25 to 0.3 mm in size.

The phrases "a little number of different grey scale region structure types", and "a limited number of different micrographic region structure types" are, we submit, quite clear. The limited number may, for example, be a palette of 16 different grey scale values ranging from a brightest value, associated with a flat reflective region structure, to a darkest value, associated with a "rocky" region structure which has maximum diffuse scattering. The phrase "appearing by reason of their different diffuse scattering characteristics to have different intensities" is simply a reiteration of the fact that the different regions have different grey scale values.

In claims 22 and 23, the phrase "the same image" refers back to claim 20 which specifies that each grey scale region structure type has one or more images. Claims 22 and 23 are limited to the circumstance in which each region structure type has the same image.

With regard to the cited patent, U.S. Patent 5,428,479 issued to Robert Lee (one of the inventors of the present invention), we note that the citation refers to a diffractive surface relief structure. Diffractive surface relief structures result in zero order, first order, second order, etc. diffraction images which can be viewed from particular ranges of viewing angles around a

diffractive device. They do not result in images which can be viewed from any direction. Diffuse scattering is generally considered to be something quite different from diffraction.

For the above reasons, Applicants respectfully request reconsideration and withdrawal of the outstanding rejections and an indication of allowable subject matter.

Also submitted herewith are an Appointment of Associate Attorneys and a Request for Extension of time in which to file a response extending the time for response for three months from May 1, 2001 until August 1, 2001, together with the requisite fee therfor.

July 25, 2001
Date

Respectfully submitted,

Vangelis Economou

Vangelis Economou -Reg. No. 32,341
c/o Ladas & Parry
224 South Michigan Avenue - Suite 1200
Chicago Illinois 60604
Tel. No. (312) 427-1300

MARKED UP VERSION OF SPECIFICATION PARAGRAPHS

At page 1, lines 1-21, delete the two paragraphs and substitute the following:

FIELD OF THE INVENTION

The invention relates to a micrographic device. It relates particularly but not exclusively to a security device which generates a grey scale image when illuminated by a light source and viewed by an observer, and to an authentication device which incorporates graphic elements line art or images represented in microscopic size in repeated regions of its surface relief structure. The device may be used in a number of different applications, and it has particular applicability as an anti-forgery security device on bank notes, credit cards, cheques, share certificates and other similar documents.

BACKGROUND ART

Recent improvements in reproduction technology have made it easier for a person to forge a copy of a valuable document. Various different types of security devices are available to protect against copying. One such type of security device is a hologram of the type which has been applied to VISA™ and MasterCard™ credit cards since 1984. When viewed under appropriate illumination conditions (best seen with a point light source such as a single incandescent globe), holograms generate an image which appears to change as the angle of observation changes. When not illuminated, the hologram as a silver appearance. Holograms provide protection against color [colour] photocopying and similar reproductive techniques because such reproductive techniques cannot reproduce the ability to generate images which differ when viewed from different angles.

At page 4, lines 31 to page 5, line 2 delete the paragraph and substitute the following:

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will hereafter be described in greater detail with reference to the attached drawings which show example forms of the invention. It is to be understood that the particularity of those drawings does not supersede the generality of the preceding description of the invention.

At page 5, lines 20-27, delete the paragraph and substitute the following:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to Figure 1, there is shown a device 1 having surface relief structure 2 which has a plurality of regions 3. Regions 3 include grey scale regions 4, which are too small to be separately resolvable to the human eye. (They are shown in much magnified state in Figure 1). Each grey scale region 4 is one of a limited number of different grey scale region structure types. The different grey scale region structure types appear, by reason of their differing diffuse scattering characteristics, to have different intensities when device 1 is illuminated by light source 5 and viewed by an observer 6.

MARKED UP COPY OF CLAIMS

27. (Amended) A device according to [any] one of claims 19 or 24 [19 to 26] wherein, when the device is illuminated by a light source and viewed by an observer, the observer sees in microscopic form an image which corresponds with a microscopic image represented in the surface relief structure of some or all of the regions.

28. (Amended) A device according to [any] one of claims 19 or 24 [19 to 27] further including a plurality of diffracting regions such that, upon illumination by a light source, the device generates one or more diffraction images which are observable from one or more ranges of viewing angles around the device.

34. (Amended) A valuable document incorporating a device according to [any] one of claims 19, 24 or 33 [19 to 33] wherein printing on the valuable document matches up with, and appears to be continuous with regions on the device which have a printed appearance.

35. (Amended) A device according to [any] one of claims 19, 24 or 33 [19 to 33] which is used for authentication purposes, wherein authentication of the device takes place by microscopic examination and recognition of the regions.

36. (Amended) A device according to [any] one of claims 19, 24 or 33 [19 to 33] which is used for authentication purposes, wherein authentication of the device takes place by machine recognition of the regions.